

WHAT IS CLAIMED IS:

1. A purified or isolated nucleic acid consisting essentially of a nucleotide sequence that encodes the same UDP-N-acetylmuramoylalanine-D-glutamate ligase encoded by nucleotides 11357 to 12736 of SEQ ID NO:35 or a nucleotide sequence fully complementary thereto.

2. The purified or isolated nucleic acid of Claim 1, wherein said nucleic acid sequence consists essentially of nucleotides 11357 to 12736 of SEQ ID NO:35 or a nucleotide sequence fully complementary thereto.

3. A purified or isolated oligonucleotide consisting essentially of a fragment of a nucleic acid having the nucleotide sequence of nucleotides 11357 to 12736 of SEQ ID NO:35 or a sequence complementary thereto, wherein said oligonucleotide is at least 22 nucleotides in length.

4. A recombinant construct comprising a nucleotide sequence that encodes the same UDP-N-acetylmuramoylalanine-D-glutamate ligase encoded by nucleotides 11357 to 12736 of SEQ ID NO:35, or a nucleotide sequence fully complementary thereto, operably linked to a promoter.

5. A method of making UDP-N-acetylmuramoylalanine-D-glutamate ligase of *Moraxella catarrhalis* comprising:

obtaining a nucleic acid consisting essentially of a nucleotide sequence that encodes the same UDP-N-acetylmuramoylalanine-D-glutamate ligase encoded by nucleotides 11357 to 12736 of SEQ ID NO:35;

inserting said nucleic acid in an expression vector such that said nucleic acid is operably linked to a promoter; and

introducing said expression vector into a host cell whereby said host cell produces the protein encoded by said nucleic acid.

6. The method of Claim 5, further comprising isolating the protein.

7. The method of Claim 5, wherein said nucleic acid sequence consists essentially of nucleotides 11357 to 12736 of SEQ ID NO:35 or a nucleotide sequence fully complementary thereto.

8. A method for constructing a host cell that expresses UDP-N-acetylmuramoylalanine-D-glutamate ligase of *Moraxella catarrhalis* comprising

introducing a recombinant construct comprising a promoter operably linked to a nucleic acid comprising a nucleotide sequence that encodes the same UDP-N-acetylmuramoylalanine-D-glutamate ligase encoded by nucleotides 11357 to 12736 of SEQ ID NO:35 into said cell.

9. The method of Claim 8, wherein said nucleic acid sequence consists essentially of nucleotides 11357 to 12736 of SEQ ID NO:35 or a nucleotide sequence fully complementary thereto.

10. A vector comprising the purified or isolated nucleic acid of Claim 1

11. The vector of Claim 10, wherein the isolated nucleic acid is operably linked to a promoter.

12. The vector of Claim 11, wherein the vector is an expression vector.

13. A cultured cell line comprising the vector of Claim 10.

14. A vector comprising the purified or isolated nucleic acid of Claim 2.

15. The vector of Claim 14, wherein the isolated nucleic acid is operably linked to a promoter.

16. The vector of Claim 15, wherein the vector is an expression vector.

17. A cultured cell line comprising the vector of Claim 14.

18. An isolated expression construct comprising nucleotides 11357 to 12736 of SEQ ID NO:35, which encodes UDP-N-acetylmuramoylalanine-D-glutamate ligase, or a nucleotide sequence fully complementary thereto, operably linked to a promoter.

19. A purified or isolated nucleic acid consisting essentially of a nucleic acid sequence which hybridizes under high stringency to nucleotides 11357 to 12736 of SEQ ID NO:35 and which encodes UDP-N-acetylmuramoylalanine-D-glutamate ligase.

20. A purified or isolated nucleic acid which hybridizes substantially over the entire length to nucleotides 11357 to 12736 of SEQ ID NO:35 or a sequence complementary thereto under the following conditions: 5X SSC with 1% SDS at 60°C; and washing with 0.2X SSC with 0.1% SDS at either 45°C or 68°C or 0.5M sodium phosphatate (pH 7.2), 7% SDS, and 1mM EDTA at 65°C; and washing with 40mM sodium phosphate, 1% SDS, 1mM EDTA at 65°C.